

PUBLIC HEALTH AND SEWAGE DISPOSAL

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In a recent survey made by the Izaak Walton League of America under the directorship of Dr. W. D. Hatfield, Superintendent of the Decatur sewage treatment plant, it was established that 60,000,000 people of the United States are served by sewer systems and that only 18,600,000, or 31 per cent, have some form of sewage treatment and that over 40,000,000 people in the United States are dumping untreated sewage into our country's inland and coastal waters. These amazing facts show conclusively that we in America have been making disease incubators out of our water courses.

The Roman Senate in the year 80 A. D. issued an order that it was necessary to save the water supply, as it was not only to be utilized for cleaning the city, but also for flushing the sewers. The collection of sewage, however, remained an unsolved problem until the nineteenth century. The London sewers were commenced early in the nineteenth century. Hamburg, Germany, laid out its sewerage system in 1842. Berlin's present system dates from 1860. Chicago in 1855 began the first general system in the United States.

The bath tub in its relation to modern plumbing is less than one hundred years old. Thirty-five years after the first comprehensive system of sewers was laid in the United States, attention was first directed to the objectionable condition produced by the discharge of sewage into American rivers. The year 1890 found men thinking about the importance of the practice of placing the untreated sewage into the water courses. Prof. A. N. Talbot of the University of Illinois designed one of the first Septic Tanks in 1897. Shortly after the development of methods to treat sewage, laws were approved making it possible for our people to take advantage of these scientific discoveries.

ILLINOIS LAWS REGULATING SANITARY DISTRICTS

Harry F. Ferguson, Chief Sanitary Engineer of the Illinois Department of Public Health, in his pamphlet on Sanitary Dis-

tricts in Illinois, lists three laws in force in this state regulating the formation and operation of sanitary districts, primarily for the disposal of sewage. Two of these laws are special; one controls the Sanitary District of Chicago, approved 1889, and the other the North Shore Sanitary District, approved 1911. A sanitary district law of general application was passed by the legislature in 1917 and is popularly known as the law of 1917. It was amended by the legislature in 1923 and 1927. Sixteen municipalities have taken advantage of this act and have plants in operation or under construction. They are as follows:

Bloomington-Normal	Peoria
Decatur	Hinsdale
Downers Grove	Galesburg
Elgin	Matteson
Aurora	Rockford
Springfield	Urbana-Champaign
Wheaton	Taylorville
Clinton	DeKalb

One or two other cities at the present time are building plants under the local improvement act.

In Bulletin 20, State Water Survey, A. M. Buswell, Chief, a preliminary notice of a survey of the sources of pollution of the streams of Illinois shows that a total of 134 municipalities are dumping untreated sewage in the streams of the state, that 70 towns include treatment with some sort of settling tanks, and that 59 towns include treatment with settling tanks plus additional treatment units. This information indicates that Illinois has considerable more work to do in freeing her water courses from pollution and reducing sickness directly chargeable to this deplorable condition. In the Forty-third Annual Report of the Illinois Society of Engineers, page 83, will be found a tabulation of data on Illinois Sewage Treatment Plants, compiled by Harry F. Ferguson with the assistance of A. F. Dappert and C. E. Schwob, members of his staff. This tabulation is very complete and permits careful study of capacity and design used by our various cities.

POLLUTED STREAMS STRIKE BACK

An inspection of some of our streams will reveal a conglomeration of filth, sewage, and a breeding place for disease. Hundreds of recorded cases in this country have established polluted water as the cause of community epidemics.

It is established that ninety-nine per cent of all infections are taken into the body through the mouth. They reach the mouth in water and food, on fingers and dust. Infection may enter the body through (1) the respiratory tract, (2) the digestive tract, (3) the skin.

Dr. Raymond Pearl reports that functional disturbances of the alimentary tract and associated organs are responsible in the United States for 334.9 deaths in each 1,000, the remainder being due to other causes. It is clear that an opportunity for retarding death rates lies in the elimination and control of the causes of disease of the alimentary tract.

Does the polluted stream strike back? It does and in several ways: Its water is unfit for drinking and bathing. Diseases are carried from it by flies. Cattle drink water from and wade in polluted streams, perhaps unknown to the farmer, but known to the city administration that is permitting such pollution, thus contaminating the milk supply.

SICKNESS AND DEATH EXPENDITURES

Dr. Louis I. Dublin, Statistician of the Metropolitan Life Insurance Company, in his article on "The Economics of World Health" printed in *Harper's Monthly*, November, 1926, gave a few figures that tell a story of waste in human life that we as a people must seriously recognize.

(1) Nineteen dollars per capita average expenditure for medical and nursing care in illness per year, representing a cost of more than a billion dollars per year.

(2) One hundred twenty thousand babies die from preventable causes during the first year of life. Capital value of boys, \$9,000; girls, \$4,600. Preventable infant mortality represents a capital cost of three-quarters of a billion dollars per year.

(3) Thirty thousand young men and women, 25 to 29 years of age, die each year from preventable causes. Loss about three-quarters of a billion dollars.

(4) Six billion of dollars can be saved each year in accepting modern preventive medicine and public health measures.

EDUCATIONAL EXPENDITURE

National expenditure for education in the public school system of the United States is \$1,588,671,000, or a per capita cost of \$14.70 on a population basis of 110,000,000.

This shows the amazing fact that we spend \$4.30 per capita more for careless and incorrect living, disregard for health rules and measures, than we spend on our school system. This deplorable condition is certainly chargeable to the "I don't care" attitude of a people who by the necessity of existence finally will accept the discoveries of the scientists and apply them to every community and every individual.

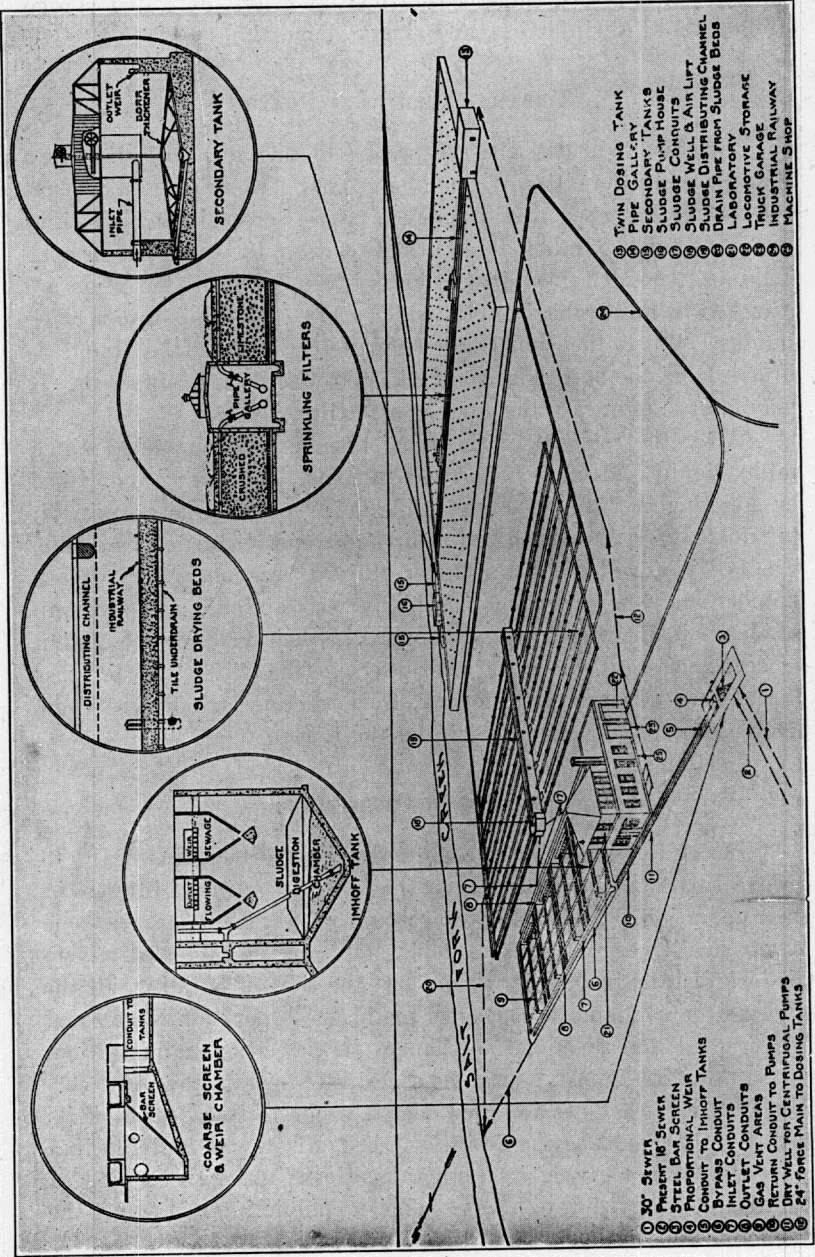
MUNICIPAL EXPENDITURES

A city and its municipal government makes it possible for its citizenry to unite and do things which they cannot do as individuals. Today the city, through the taxes received, protects life and property, safeguards health, protects from fire, builds, cleans, and lights the streets, helps to build county roads and bridges, maintains free employment bureaus, educates the children, offers library facilities, give opportunities for recreation in parks, administers justice, supplies nurses, health officers, and hospital service, inspects the food and water supply, the gas and electricity for lights and domestic services, and maintains storm drains and sewerage systems. This service costs money, a lot of money as a lump sum, but on a per capita basis surprisingly little. In a city of 300,000 all these blessings of community enjoyment cost only \$16.62 per capita per year, which is \$2.38 less than is spent on illness.

TREATMENT OF SEWAGE

Every state and municipal official and every citizen should encourage and demand healthful environment for community life. Properly designed and managed sewage treatment plants must be a part of every community. They should and must be as common to our towns as the fire department and the city building. In the treatment of sewage another safeguard is established in the protection of the Public Health.

The treatment of sewage includes the destruction of pathogenic bacteria, the elimination of offensive odors, and the removal of solid organic matter which would absorb the oxygen from the water if dumped into a stream. The modern plant thus prevents the destruction of aquatic life in the stream, and disposes of the liquid portion in such a way that nature can complete its purification. The several methods used in the design of American disposal plants are as follows: screening, sedimentation, septic



tanks, contact beds, sand beds, trickling filters, activated sludge, Imhoff tanks, disinfection, and sludge disposal.

URBANA-CHAMPAIGN PLANT

Briefly I will describe the process of sewage purification in a plant serving the cities of Champaign and Urbana. In this plant the sewage is passed first through a coarse screen, then flows into two-story tanks (Imhoff tanks) 33 feet deep, in which the heavier solids settle and collect in the lower story, where these solids are attacked by an aërobic bacteria which reduce the solids into a black humus. When the solids are completely digested, the sludge is drawn from the bottom of the tanks and placed on drying beds. It may later be removed and used as a fertilizer.

After the removal of the heavier solids, the sewage is still a milky liquid and must be further purified. This is accomplished by spraying it through nozzles (like lawn sprays) and allowing it to trickle down through a bed of broken stones about ten feet deep. The bed is provided with an under-draining system. An enormous number and a great variety of plants and animals soon take up residence in these rock beds to engage in their favorite occupation of scavengers. This water after leaving the filters is to pass through a secondary settling tank, Dorr tractor clarifier type (now under construction), before joining the stream.

NEGLECT IN OPERATION

One of the tragedies of community expenditures in regard to sewage treatment plants has been the lack of continued interest in their operation. An investigation would reveal, I am sure, in some of our smaller communities, a deplorable condition due entirely to the lack of intelligent supervision. At the time of building, all the information available as to correct methods of operation is collected and studied, but after a few changes in the city administration, the information is lost, as well as a desire to operate the plant correctly. A city that has followed such a program soon learns of its futility. It should be the desire of every citizen who is living in a town that is not giving its sewage treatment units the benefit of intelligent supervision to arouse sufficient public interest to get the condition improved.

RESPONSIBILITY

The engineering and chemical professions have an important obligation to perform for society in the design and construction of the modern sewage treatment plant. These two great forces must have the interest of each community at heart. For the sake of continued public acceptance of sanitary science, only tried methods and design should be considered. The taxpayer in the end will be the judge of the work.

Biologists, chemists, and engineers have given to civilization a way to care of its wastes. The pollution problem is now in the hands of the citizens, and any delay in adopting proper methods for the treatment of municipal and industrial refuse is directly chargeable to you and me as taxpayers in our respective communities. The question of proper sewage treatment is a challenge to the pride of every community. As Dr. Henry Baldwin Ward, National President of the Izaak Walton League of America, puts it: "Sanitation means civilization, not only success, but comfort and happiness, and even more than that, it means existence. The penalty of ignorance and carelessness comes in the form of disease, death, and destruction."

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- Water Purification—Ellms.
- Public Health Engineering—Phelps.
- Sewerage & Sewage Treatment—Babbitt.
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